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(56) Documents Cited

**GB 1209196 A**

(58) Field of Search

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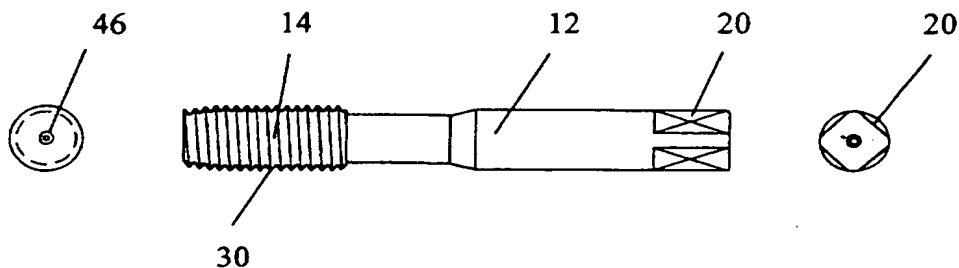
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(54) Abstract Title

**Tap tools**

(57) A tap tool, for forming female threads in a workpiece, comprises a mounting shank 12 and a head 14 which has forming lobes and is made from carbide material. The head 14 is of composite form comprising a spigot on one end of the shank, which spigot is fixed concentrically in a socket within a cylinder or cap of the carbide material. The cylinder has a peripheral surface in which a forming thread 30 is formed.

FIG. 1



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FIG. 1

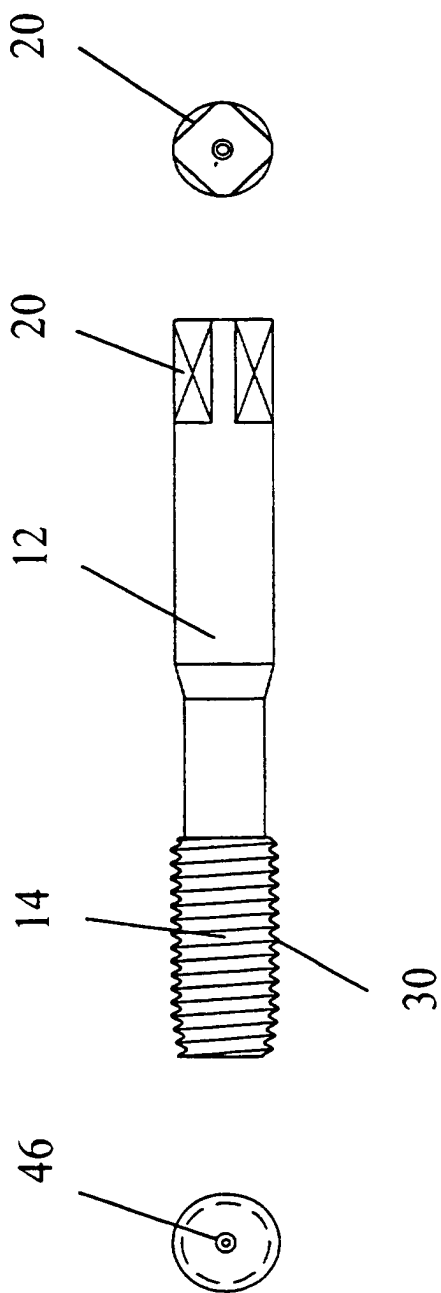


FIG. 2

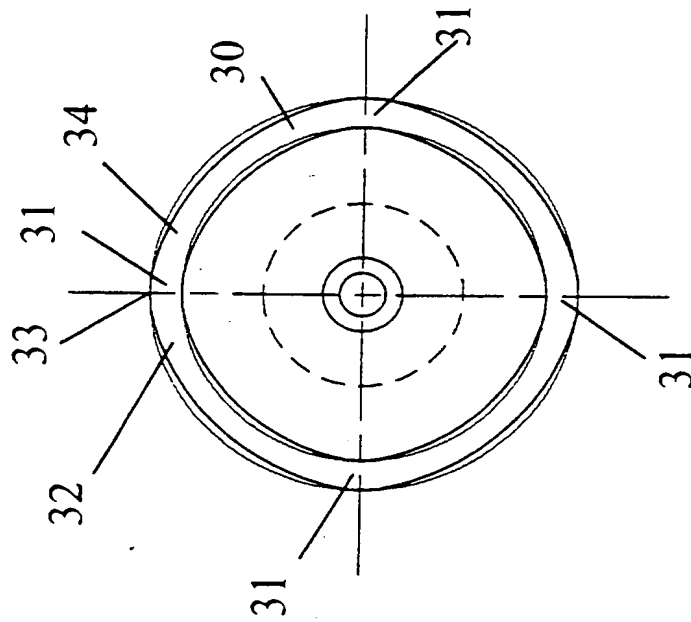


FIG. 3

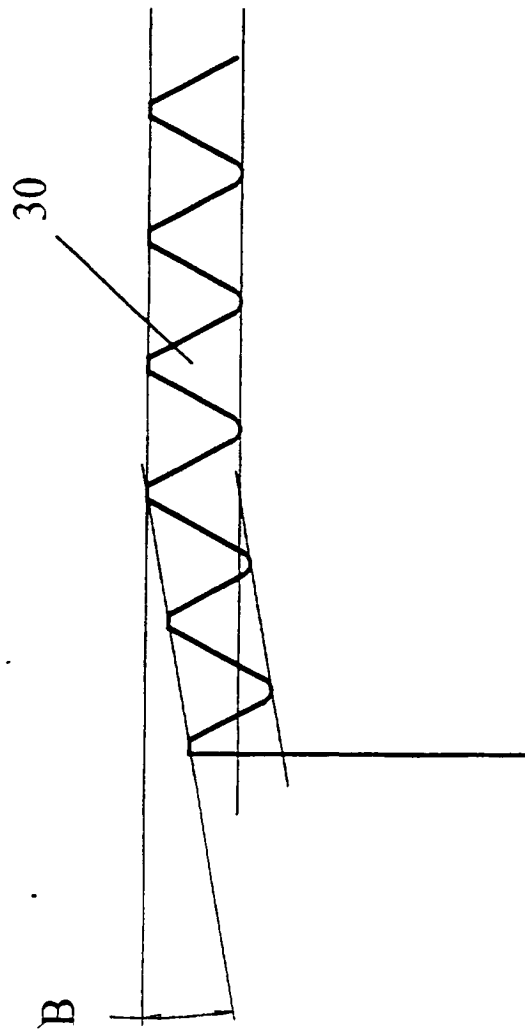


FIG. 4

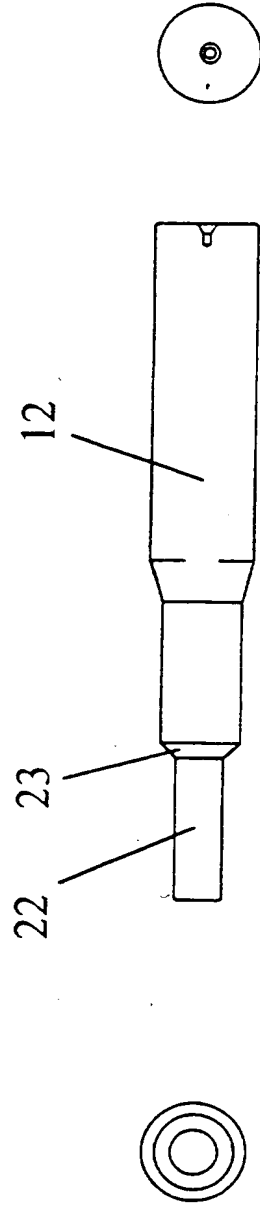
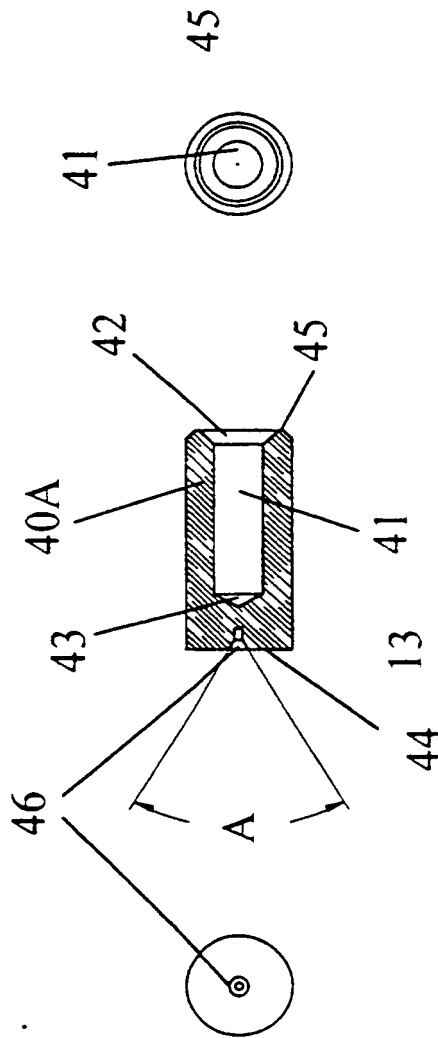


FIG. 5



TAP TOOLS

This invention concerns tap tools, for forming female threads in a workpiece, such as a nut or socket, of a kind comprising a mounting shank and a head in which the head  
5 has forming lobes made from carbide material.

A tool of said kind is disclosed in DE 39 34 621 A1 in which thin strips of carbide material are secured in radially open grooves which extend longitudinally of the  
10 forming head, the strips being formed so as to provide thread segments aligned with a male thread formed on the head. These strips are vulnerable to damage at the front where the carbide is particularly thin.

15 Tap tools are also known which are made wholly of solid carbide material. It is known that carbide materials are very brittle and such tools are prone to break when subject to shock loads and misalignment which commonly arise during tapping. However, carbide material  
20 is also well known to be very expensive, and such expensiveness is a problem in itself.

In order to reduce the above problems the present invention provides a tap tool of the kind mentioned at the  
25 beginning hereof, which is characterised in that the head is of composite form comprising a spigot on one end of the shank, which spigot is fixed concentrically in a socket within a cylinder or cap of the carbide material, which cylinder has a peripheral surface in which a cutting thread

is formed.

The radial thickness of the cylinder wall to the root of the thread is preferably greater than the maximum depth  
5 of the thread and is preferably less than the spigot diameter in order to maximise the torsional strength of the joint between the spigot and the socket.

The length of the socket is preferably greater than  
10 that of the spigot to leave a bonding material reception space between the ends thereof when the spigot is inserted fully into the socket.

An end face on the wall of the cylinder preferably  
15 confronts a shoulder formed on the shank, and may be bonded thereto by bonding material. Said end face is preferably chamfered.

The preferred bonding material is a brazing material.  
20 A mechanical fixing between the spigot and the socket may also be used.

The thread is preferably ground so as to be lobed, and preferably, there are a small plurality of, e.g. three,  
25 four, five or more lobes per turn at equal angular intervals. Each lobe is preferably cam shaped to provide rising and descending flanks to an apex over an arc.

The invention will be described further, by way of



example, with reference to the accompanying diagrammatic drawings, wherein:-

FIGURE 1 shows a tap tool of the invention, in side  
5 elevation;

FIGURE 2 shows a section on the line II-II in FIGURE 1;

FIGURE 3 is a thread detail diagram of a conical lead of  
10 the tap tool;

FIGURE 4 shows a shank of the tap tool in side elevation;  
and

FIGURE 5 shows a carbide blank in longitudinal section  
15 prior to being mounted on the shank and ground to form the  
cutting head of said tap tool.

The tap tool 10 (FIGURE 1) comprises a shank 12 and a  
head 14 secured together by brazing material.

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The shank has a driving square 20 (FIGURE 1) at one  
end, and a cylindrical spigot 22 (FIGURE 4) at the other  
end of a stem which terminates at a shoulder 23. The  
driving square 20 is of known form. The shank is made from  
25 steel a tough material such as HSS grade steel and is  
ground to size.

The forming head 14 comprises a cylinder or cap 40 of  
carbide material formed from a blank 40A (FIGURE 5) which

provides an internal socket 41 having a mouth 42 at one end 45 of the cylinder, and provides a small co-axial centre hole 46 at the other end 44 of the cylinder. Said hole 46 is tapered at a cone angle A, and said end 45 is internally and externally chamfered, e.g. at about 45°, so that its face is tapered to produce a shoulder.

The socket 41 is axially longer than the spigot 22 so that when the spigot 22 is brazed into the cylinder 40, brazing material can flow into and be accommodated in the space 13 between the end 43 of the socket 41 and the end of the spigot. Excess brazing material or flux can escape back along the clearance between spigot and socket 41. During brazing the tapered face of said end 45 may be brazed to the shoulder 23.

After brazing, excess flux or brazing material is cleaned off and a thread 30 is ground into the peripheral surface of the cylinder 40.

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The thread 30 is ground as indicated in FIGURE 2 to provide, in this example, four lobes 31 per turn at 90° intervals so that the lobes are aligned in four rows extending longitudinally of the head. Each lobe has a rising flank 32, an apex 33 and a descending flank 34 and extends over an arc of about 20°. A conical lead is ground onto the first flow threads, e.g. 2 to 7, typically threads at a small angle B of typically about 7° to the axis as indicated in FIGURE 3.

The overall thread depth is less than the radial thickness of the wall of the cylinder as can be appreciated from FIGURE 2, and said wall thicknesses is less than the diameter of the spigot.

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The invention is not confined to details of the foregoing example, and many variations and modifications, e.g. the number of lobes, the lead angle, the thread pitch and form, and relative thickness, may be made within the  
10 scope of the invention.

The invention further includes a tool having any novel feature or novel combination of features disclosed herein or in the drawings; and also includes a method of  
15 making a tool as disclosed herein. The method may include any novel step or combination of steps disclosed herein.

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CLAIMS

1. A tap tool, for forming female threads in a workpiece, comprising a mounting shank and a head which has forming lobes made from carbide material, and characterised in that the head is of composite forming comprising a spigot on one end of the shank, which spigot is fixed concentrically in a socket within a cylinder or cap of the carbide material, which cylinder has a peripheral surface in which a forming thread is formed.

2. A tap tool as claimed in Claim 1 wherein the radial thickness of the cylinder wall to the root of the thread is greater than the maximum depth of the thread and is less than the spigot diameter.

3. A tap tool as claimed in Claim 1 or 2 wherein the length of the socket is greater than that of the spigot to leave a bonding material reception space between the ends thereof when the spigot is inserted fully into the socket.

4. A tap tool as claimed in Claim 1,2 or 3 wherein an end face on the wall of the cylinder confronts a shoulder formed on the shank, and is bonded thereto by bonding material.

5. A tap tool as claimed in Claim 4 wherein said end face is chamfered.

6. A tap tool as claimed in any preceding claim wherein the bonding material is a brazing material.

7. A tap tool as claimed in any preceding claim wherein  
5 the thread is ground so as to be lobed, and there are a small plurality of lobes per turn at equal angular intervals.

8. A tap tool as claimed in Claim 7 wherein each lobe is  
10 cam shaped to provide rising and descending flanks to an apex over an arc.

9. A tap tool substantially as hereinbefore described with reference to the accompanying drawings.

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Application No: GB 9808528.5  
Claims searched: 1-9

Examiner: Dave Butters  
Date of search: 6 July 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.P): B3N  
Int Cl (Ed.6): B23G  
Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB 1209196 A ( HACHIUMA )	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.